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10/075,167	02/14/2002	Jerry Zucker	534P011c/p	8019

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EXAMINER	
ALEJANDRO, RAYMOND	

ART UNIT	PAPER NUMBER
1745	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/075,167	ZUCKER, JERRY	
	Examiner	Art Unit	
	Raymond Alejandro	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12 and 14-44* is/are pending in the application.

4a) Of the above claim(s) *3-12,26-32,36-39 and 42* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,14-25,33-35,40,41,43 and 44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 February 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

This office action is responsive to the amendment filed 11/18/03. The applicant has overcome the objections; the art rejections; and the statutory type double patenting for certain claims. However, the instant claims (including newly added claims 43-44) are rejected again over art as seen below.

Election/Restrictions

1. Applicant's election of Group I and Species 1 (claims 1-2, 5-10, 18-20 and 25-26 {generic} and claim 3 {species}) in Paper No. 7 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Double Patenting

NOTE: Potential Double Patenting:

Applicant is advised that if during the prosecution of the present Application No. 10/075167 (*US Publication No: US 2003/0054233*) the invention of claim 1 is shifted to also claim the invention of claims 3-4 (now withdrawn from consideration):

i) claims 1 and 3-4 of the present application might be provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1 and 4 of copending Application No. 09/957602.

The copending application'602 claims the following (claims 1 and 4):

1. (Currently amended) A battery separator comprising at least one fibrous layer consisting essentially of glass fibers and at least one support layer, wherein said support layer is formed of an acid-resistant material and comprises a plurality of macroscopic openings having diameters larger than 50 μm and penetrating the whole thickness of said support layer providing direct ionic transfer through said support laver via straight paths extending substantially perpendicular to the extended plane of said support laver.

4. (Withdrawn) A battery separator according to claim 3, wherein the fibrous layers comprise 20 to 40 % by weight of glass microfibers having an average diameter of less than 1 gm and 60 to 80 % by weight of coarse glass fibers having an average diameter of about 3 μm.

The foregoing will be applicable unless applicant cancels or amends the potentially conflicting claims so they are no longer coextensive in scope; and/or properly addresses and resolves the double patenting rejections.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 18-25, 35 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aidman et al 5376477 in view of the Japanese publication JP 55-024330.

The present application is directed to a battery separator wherein the disclosed inventive concept comprises the specific acid resistant material layer and its macroscopic openings. Other limitations include the specific pore size; the layer thickness; the specific porosity; the opening spacing; the edges for sealing; the diameter; the holes/slots and the pocket shape.

With respect to claim 1:

Aidman et al disclose a battery plate separator system including three layers in face-to-face relationship, the first and third layers including a porous mat of fibers and between the first and third layers, a second layer comprising a porous organic polymeric sheet with pores (ABSTRACT). It is disclosed that the first and third layers comprise porous mat made of fibers made of glass wherein these mats preferably have a porosity of at least about 90 % (COL 1, lines 43-51). *It is noted that Aidman et al disclose two (2) porous fibrous layers and one (1) porous polymeric layer, thus, either one of the two porous fibrous layer or the porous polymeric layer acts as the support layer in the separator system; in addition, the three (3) layers do have openings or pores because they all are porous.* Aidman et al also disclose that the separators are to be used in lead-acid batteries (COL 1, lines 37-40/COL 1, lines 43-46) as well as that the separator system is inert to the electrolyte (COL 2, lines 3-5). *Thus, the layered separator system of Aidman et al is an acid-resistant material.*

With reference to claims 18-19:

Aidman et al disclose that the first and third layers comprise porous mats made of fibers wherein these fibers are made of glass and an organic polymeric material such as polyethylene or polypropylene (COL 1, lines 45-50). *Thus, the fibrous layer comprises fibers of glass and fibers of an organic polymeric material.*

As for claim 20:

Aidman et al teach in EXAMPLE 1 that the porous fibrous mats have a thickness of 0.013 inch (0.3302 mm); the flat porous thermoplastic sheet measures 0.010 inch (0.254 mm) in thickness (COL 2, lines 65 to COL 3, lines 2). Two additional batteries were made wherein each separator system contained the porous fibrous mat has a thickness of 0.026 inch (0.6604 mm) (COL 3, lines 12-16).

With respect to claims 21-24:

It is disclosed that the first and third layers comprise porous mat made of fibers made of glass wherein these mats preferably have a porosity of at least about 90 % (COL 1, lines 43-51). *Thus, the openings of the layers cover more than 60 %, 70%, 80% and 90%.*

As for claim 25:

Aidman et al disclose the layers comprising porous made of fibers having a porosity of at least about 90 % (COL 1, lines 50-51). *It is thus noted that the specific spacing of the openings is inherent because in embodiments comprising an open area in excess of 90 %, the openings are accordingly formed in closely spaced relationship and separated only by thin land areas of material so as to meet the claimed space or distance between two openings. In this regard, attention is directed to applicant's disclosure (page 15, third full-paragraph) wherein it is recognized that when the open area is more than 90 %, the openings are closely spaced between one another. Hence, since Aidman et al's layers have a porosity of at least 90 %, the opening spacing in the separator of Aidman et al does exhibit the same spacing characteristic.*

As for claim 35:

Aidman et al disclose that layers are comprises porous mats or porous sheets (COL 1, lines 46-47/ COL 1, lines 52-54). *It is noted that since the mats or sheets are porous they possess or have pores, and thus, pores are minute openings by which matter passes through a membrane, thus, the openings of the layer, at least, have the form of holes.*

As for claim 40:

Aidman et al teach in EXAMPLE 1 that the porous fibrous mats have a thickness of 0.013 inch (0.3302 mm); the flat porous thermoplastic sheet measures 0.010 inch (0.254 mm) in thickness (COL 2, lines 65 to COL 3, lines 2). Two additional batteries were made wherein each separator system contained the porous fibrous mat has a thickness of 0.026 inch (0.6604 mm) (COL 3, lines 12-16).

Aidman et al disclose a separator system comprising layers according to the above-mentioned aspects. However, Aidman et al do not expressly disclose the specific opening diameter (the pores being macroscopic).

The JP'330 document discloses a sheet separator mainly composed of glass fibers with a specific fiber diameter (ABSTRACT). A hole porous plate 1 (*the support layer*) with a maximum hole diameter less than 100 μm (*that is, larger than 50 μm*) and a porosity more than 50 %, is constructed with a phenol resin a paper material, acrylic fiber and glass fiber (ABSTRACT). The porous plate is laminated to a sheet shape separator 2 mainly composed of glass fiber of diameter less than 1 μm, for instance, likely as composed glass fiber of diameter 0.75 μm of 80 % by weight and glass fiber of diameter 11 μm of 20 % by weight (ABSTRACT). The porous plate and the sheet shape separator form a separating unit 3 (ABSTRACT). *It is noted that the combination of both glass fibers having specific diameters and weight composition*

provides a fibrous layer having an average pore size of more than 3 μm. It is also noted that since the plate is porous it possesses or has pores, and thus, pores are minute openings by which matter passes through a membrane, thus, the openings of the layer, at least, have the form of holes.

*As to the limitation of "having diameters larger than 50 μm and penetrating the whole thickness of said support layer providing direct ionic transfer through said support laver via straight paths extending substantially perpendicular to the extended plane of said support layer", it asserted that having shown the support layer of the prior art meets the specific opening diameter dimension, the above-mentioned characteristic, property and/or function (i.e. providing direct ionic transfer via straight paths) is thus inherent as the structure recited in the reference is substantially identical to that of the claims, and therefore, claimed properties, characteristics or functions are presumed to be inherent (**MPEP 2112. Requirements of Rejection Based on Inherency**). Thus, the prior art embodied separator seems to be identical except that the prior art is silent as to an inherent function, property and/or characteristic. In that, it is noted that the extrinsic evidence makes clear that the missing descriptive matter is necessarily present in the separator described in the reference, and that it would be so recognized by persons of ordinary skill.*

In light of these disclosures, it would have been obvious to one skilled in the art at the time the invention was made to make Aidman et al's battery separator by having the specific opening diameter (the pores being macroscopic) of the JP'330 reference as the JP'300 reference teaches a battery separator including hole porous plates with hole diameter of less than 100 μm

which exhibits an enhanced electrolyte absorptivity and active material holding function, and hence, a battery cell of longer service life with high gas absorption factor.

3. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aidman et al 5376477 in view of the Japanese Publication JP 55-024330 as applied to claim 1 above, and further in view of Okada et al 4725516.

Aidman et al and Van Sacken et al are applied, argued and incorporated herein for the reasons above. In addition, Aidman et al and Van Sacken et al do not disclose the specific average pore size of the separator layer.

Okada et al teach a battery separator having an average pore diameter of about 7 μm (CLAIM 7/COL 6, lines 11-15); or an average pore diameter of about 3 μm (COL 6, lines 11-15).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to make the specific average pore size (diameter) of the separator layer of Okada et al in the separator layer of both Aidman et al and the JP'330 reference as Okada et al teach that by selecting appropriately the separators within the suitable claimed range of pore diameter an improved distribution of the electrolyte content of the cell element is achieved. Thus, it allows constructing sized plates comprising a larger amount of electrolyte contained in the positive and negative active materials than that in the separators, so that the amount of electrolyte in the positive and negative active materials does not decrease and the total volume of electrolyte in the cell is not reduced due to overcharging conditions. Further, separators having the specific pore diameter distribution possess electrolyte absorption properties and retention capabilities

which are desirable in order to establish the condition that only the electrolyte in the separators decreases and the electrolyte in the positive and negative plates remains filling them when the total amount of electrolyte is decreased. Thus, the electrolyte absorption and retention power of separator is enhanced.

4. Claims 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aidman et al 5376477 in view of the Japanese Publication JP 55-024330 as applied to claim 1, above, and further in view of Waterhouse 4363856.

Aidman et al and Van Sacken et al are applied, argued and incorporated herein for the reasons above. In addition, Aidman et al and Van Sacken et al do not disclose the specific diameter of the glass fiber and polymeric fiber.

As to claims 14-15:

Waterhouse discloses a battery separator wherein glass fibers may be incorporated into the battery separator material, preferably, the glass fibers have fiber diameters less than 20 microns as the mean diameter. Exemplary of the glass fibers are the glass microfibers, those having fiber diameters of 0.20 to 4.0 microns (COL 2, lines 52-66).

As to claims 16-17:

Waterhouse discloses a battery separator material comprising polyolefin fibers such as polyethylene, polypropylene and have a fiber diameter of up to 100 microns; preferably, these polyolefin fibers have a fiber diameter of 0.01 to 20 microns (ABSTRACT/COL 2, lines 9-20). **EXAMPLE 1** shows the use of a polymeric fiber with an average fiber diameter of 4.9 microns (COL 6, lines 20-24).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to make the glass fiber of both Aidman et al and the JP'330 reference by having the specific glass fiber diameter of Waterhouse as Waterhouse teaches that exemplary of the glass fibers useful in the practice of his invention are the glass microfibers having fiber diameters of 0.20-4.0 micron because these glass fibers, when incorporated into the battery separator material per se, impart rigidity and tensile strength while maintaining the inert chemical characteristics and low ohmic resistance of the battery separator. Thus, the prior art reference directly teaches the use of glass fiber diameters within the claimed range *(SEE MPEP 2144.05 Obviousness of Ranges and In re Geisler 43 USPQ2d 1362).*

With respect to the specific diameter of the polymeric fiber, it would have been obvious to one skilled in the art at the time the invention was made to make the polymeric fiber of both Aidman et al and the JP'330 reference by having the specific polymeric fiber diameter of Waterhouse because Waterhouse teaches that preferably these polyolefins fibers have a fiber diameter of 0.01 to 20 microns because these polyolefin fibers (polymeric fibers) are suitable to be used as separator material because they have low ohmic resistance due to their diameter and have sufficient flexibility so that the final battery separator material can be folded and worked while providing good envelope integrity and ease of processing on papermaking equipment. Hence, there is provided a separator material having excellent filtering, electrical, chemical and physical properties. Thus, the prior art reference directly teaches the use of polymeric fiber diameters within the claimed range *(SEE MPEP 2144.05 Obviousness of Ranges and In re Geisler 43 USPQ2d 1362).*

5. Claims 33 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aidman et al 5376477 in view of the Japanese Publication JP 55-024330 reference as applied to claim 1 above, and further in view of Fraser-Bell et al US 2002/0106557.

Aidman et al and the JP'330 reference are applied, argued and incorporated herein for the reasons above. In addition, Aidman et al and Van Sacken et al do not disclose the specific edge regions for sealing and the separator having the form of a pocket.

With respect to claims 33 and 41:

Fraser-Bell et al disclose a separator assembly wherein if the user wishes to seal the separator assembly such that the separator assembly fully envelopes the electrode, the width of the second layer may be greater than the width of the electrode and the width of the first layer (SECTION 0033). In such an embodiment, the longitudinal edges of the second layer would extend beyond longitudinal edges 26 of the electrode and the longitudinal edges of the first layer so that the longitudinal edges of the second layer, which are in face-to-face relationship after being folded around the electrode (SECTION 0033), may be bonded to each other and thereby form a pouch around the fully envelope electrode. The fully envelope electrode may be sealed along the lower portion, the upper portion, or along the longitudinal side edges of the electrode/separator assembly combination (SECTION 0033). *It is noted that a pouch has a pocket/bag shape with an open top, a closed-bottom and closed sides.*

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to make the specific edge regions of Fraser-Bell et al in the separator layer of both Aidman et al and the JP'330 reference because Fraser-Bell et al teach that if the user wishes to seal the separator assembly such that the separator assembly fully envelopes the

electrode, the width of the second layer may be greater than the width of the electrode and the width of the first layer, that is to say, the longitudinal edges of the second layer would extend beyond longitudinal edges of the electrode and the longitudinal edges of the first layer so that the longitudinal edges of the second layer may be bonded to each other. Thus, the edges region of the separator assists to seal and bond the electrode/separator assembly.

As to the specific the separator having the form of a pocket, it would have been obvious to one skilled in the art at the time the invention was made to make the separator of both Aidman et al and the JP'330 reference by having specific form of a pocket (pouch) of Fraser-Bell et al because Fraser-Bell et al teach that the pocket (pouch) shaped separator serve to fully envelope the electrode, thereby enhancing the sealing of the electrode/separator assembly.

6. Claims 34 and 43-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aidman et al 5376477 in view of the Japanese publication JP 55-024330 as applied to claim 1 above, and further in view of Van Sacken et al 5747188.

Aidman et al and the JP'330 reference are applied, argued and incorporated herein for the reasons above. However, Aidman et al and the JP'330 reference do not expressly disclose the openings (pore) being macroscopic and the specific diameter of the openings.

With respect to claims 34 and 43-44:

Van Sacken et al disclose a battery separator wherein the outer separator section comprises a plurality of macroscopic holes (COL 3, lines 47-50/ COL 4, lines 40-44). Van Sacken et al disclose that the separator comprises a plurality of macroscopic holes greater than 1 μm in size (COL 8, lines 38-47). *It is noted that macroscopic holes greater than 1 μm in size*

does encompasses openings having a diameter of more than 1 mm. Thus, the prior art reference teaches the use of macroscopic holes having the claimed diameter (SEE MPEP 2144.05 Obviousness of Ranges and In re Geisler 43 USPQ2d 1362).

In view of these disclosures, it would have been obvious to one skilled in the art at the time the invention was made to make the macroscopic openings of Van Sacken et al in the battery separator of Aidman et al as Van Sacken et al teach that separator comprising a plurality of macroscopic holes serves as the internal shorting means of the battery. Accordingly, by incorporating the separator comprising the plurality of macroscopic holes inside the battery container an improved safety behavior is achieved because it provides an extrinsic internal shorting means which is geometrically configured with respect to the electrode features such that an extrinsic internal short is created in the extrinsic shorting region or regions upon application of the increasing non-uniform pressure. Further, the provision of an extrinsic region wherein an extrinsic internal short occurs prior to impedance matching prevents maximum power dissipation from occurring in the intrinsic region or regions alone. Thus, the maximum local heating in any single region is reduced. Additionally, since the extrinsic internal short occurs outside the active electrode assembly, energy can be dissipated in a region that may be less sensitive chemically to heat generation and hence less prone to a runaway reaction. Thus, separators having the plurality of macroscopic openings, when used in a battery, provide an improved safety behavior under conditions of mechanical abuse, in particular crush type abuse. Further, Van Sacken et al teach that the embodiments of the invention can be of various sizes, designs and electrochemistries.

With respect to the specific diameter of the openings, it would have been obvious to one skilled in the art at the time the invention was made to make separator layer of Aidman et al by

having the specific opening diameter of Van Sacken et al as Van Sacken et al teach that separator comprising a plurality of macroscopic holes serves as the extrinsic internal shorting means of the battery, as discussed in the immediately preceding paragraph, and hence such separators having the plurality of macroscopic openings, when used in a battery, provides an improved safety behavior under conditions of mechanical abuse, in particular crush type abuse. *It is also noted that macroscopic holes greater than 1 μm in size does encompasses openings having a diameter of more than 1 mm. Thus, the prior art reference teaches the use of macroscopic holes within claimed diameter (SEE MPEP 2144.05 Obviousness of Ranges and In re Geisler 43 USPQ2d 1362).*

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:30 am - 7:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Raymond Alejandro
Examiner
Art Unit 1745